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BY E. C. JONES.

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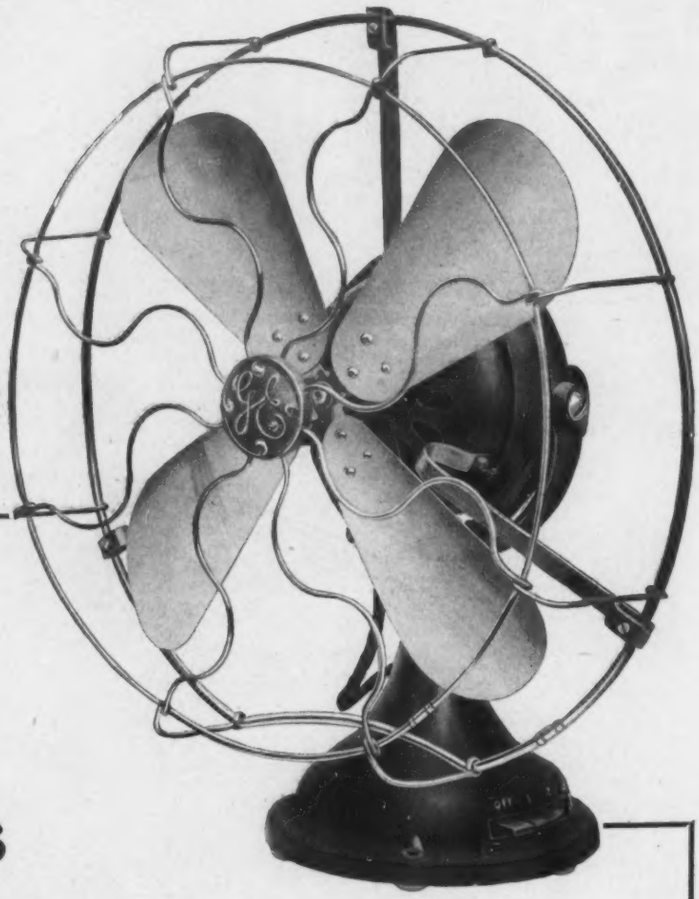

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LIGHTING THE PANAMA-PACIFIC EXPOSITION

The Panama-Pacific International Exposition as It Will Appear at Night.

If the Panama-Pacific International Exposition in 1915 at San Francisco shall fittingly celebrate the opening of the Panama Canal, the lighting scheme planned for the Exposition itself will surely be commensurate with the significance and dignity of such an important event. No exposition in the history of the world has ever been lighted in the novel manner which will characterize the illumination of the Panama-Pacific. The day of the "White City" has passed. At San Francisco in 1915 The East will mingle with The West amid a wealth of color by day and a magnificance of soft blending rays by night. Practically nowhere at night will the source of light be directly visible; but everywhere will be diffused, will glow, sparkle, scintillate variegated harmonious color tones from structures studded with myriads of jewels, through pearly mists and banners radiating the delicacy of tapestry, on shimmering pools and softly tinted reflecting surfaces. The effect of the ensemble will be a vision of ever-changing color rivaling the iridescent beauty of an enchanted fairyland.

The Universal Exposition, is scheduled to open February 20 and continue until December 4, 1915; while the Panama Canal which it commemorates will be officially opened in full running order by the government on January 1 of that year. At the outset, because the Canal will afford a new trade route for the commerce of the Eastern and Western Hemispheres, the question of devising a scheme of decoration and illumination that would not only distinguish the exposition as unique among its kind but also typify in a measure the traditions of both the Orient

and the Occident, seemed of utmost importance. That the lighting effects should be designed along entirely new lines appeared imperative. The day of dazzling white expositions had been outdone. Mr. W. D'Arcy Ryan, director of the illuminating laboratory of the General Electric Company, was appointed to undertake the commission. As an illuminating engineer Mr. Ryan has already achieved national fame through his successful illumination of Niagara Falls and of the Hudson-Fulton celebration. Recently he has also devised the method for lighting the Panama Canal itself. That Mr. Ryan will meet the challenge of the world to the Directors of the Panama-Pacific Universal Exposition, "Give us something new," is exemplified and inherent in his design of the illuminating features. Here for the first time will people of all lands gaze upon an exposition which will be known and famed as "The City of Color."

"The lighting of this exposition," to quote Mr. Ryan, "will surpass anything in lighting in the world's history. The advancement since the last big exposition in the science and art of electrical engineering and the development of electric apparatus has been so great that we are now able to produce effects with economy which would have been physically impossible five or six years ago. In 1915 there will not be a single piece of lighting that has ever been used before. Everything will be new."

There will be no outlining of buildings with incandescent lamps. Outline lighting has been done about as well as it can be done. The streets of every large city today are ablaze with it, displayed in almost innumerable applications. While undeniably beautiful from a distance, outline lighting often produces contrasting glare and dark spaces; and when it comes to getting effects from mirror surfaces, such as lagoons and moats, it is sometimes impossible to secure completely the desired results. Naturally, all of these effects were considered very satisfactory not so long ago, and we caught our breath in admiration when the current was turned on yesterday's exposition; but this newest exposition is is to be wholly different in its decorative and lighting features.

While all surfaces and lights will be rich with color, there will be no glaring combinations. There will be nothing garish. The highest artistic results will be achieved with a wealth of softened tones that blend readily. The ground tone will be about the color of travertine stone, intensified by lighting to an ivory yellow which will appear almost white from a distance. Distinctive tones, so regular that they will blend in varied harmonies, Pompeiian red, strong Italian blues, vermilion and orange tones will be employed in the special color scheme. In certain colonnades the walls behind the ivory-toned pillars will be of Pompeiian red. Much of the statuary, particularly the groups, will be warm with color. The walls of many of the arcades will be adorned with huge mural paintings. The lily pools and beds of massed bloom will be encompassed by rising structures which will rival them in the beauty of color display.

The plan of the buildings is as unique as is the harmonious decorative and lighting scheme. There will be no assemblage of individual palaces separated by huge intervening areas which operate to dwarf facades however imposing. Eight of the main exhibit palaces will form parts of a correlated group surrounding the three principal courts. They will represent in connection a stupendous Oriental Bazaar, similar in form to the bazaars of the East, at Constantinople, Damascus or Cairo. All roofs of the buildings will be colored a reddish pink, like Spanish tile, and will spread out over fifty acres along the blue waters of the bay. In the setting will be patios gay with color, cornices supporting warmly tinted figures, towers and minarets pranked with red and blue and orange, and domes flashing with the yellow ochre of gold and emerald green of copper.

The official colors of the exposition are vermilion, burnt orange and a very rich Oriental blue. Thousands of flags will flutter on the buildings in the breeze from the Pacific; but they will be rivaled like the flowers, where heretofore they have had a monopoly of color. To make the flags, bunting and decorations of this kind altogether different from any other exposition, the colors have been placed in the design in alternate squares. At night, the play of the illumination will be directed so that colors will hold their absolute values.

An excellent impression of the ensemble may be gained from the words of Mr. Jules Guerin, the director of color for the exposition. "Imagine a gigantic Persian rug of soft melting tones, with brilliant splashes here and there, spread along the waterside for a mile or more, and you may get some idea of what the 'City of Color' will look like when viewed from the heights about the bay. This color plan alone will make the exposition unique among the expositions of the world."

The exposition grounds contain 625 acres in the Harbor View section, forming a natural amphitheatre overlooking San Francisco Bay and the Golden Gate entrance from the Pacific. They include part of the United States military reservations, the Presidio on one end and Fort Mason on the other. The grounds are within the city limits of San Francisco, less than two miles from the heart of the business section, extend over two miles along the water front and average one-half mile wide.

In composition the architectural plan consists of three principal elements, that of the center being the main group of exhibit palaces and the other two elements balancing on either side. To the east are the amusement concessions, while to the west lies the small city of foreign government pavilions and states buildings. The main exhibition palaces occupy over 100 acres, covering an area over 4000 feet long by 1200 feet wide. They are flanked by tropical gardens on the north and south sides, containing about 100 acres, in which the festival hall and the horticultural building will set. The foreign government and states buildings spread over about 150 acres of the government Presidio.

The majority of the main palaces are architecturally united into one enormous structure, equal in height to the average six-story city building and rising up 65, 150, 200 and 350 feet above ground. The palaces of education, fine arts, administration, varied industries, manufacture, liberal arts, machinery, mining, transportation and agriculture are approached con-

secutively like the rooms of a single colossal palace, and identified chiefly by their interior equipment as one passes through great corridors 40 ft. wide and 100 ft. high with exhibits to the right and left. Here will be seen in this main block group the most monumental expressions in Greek and Roman classic, Occidental and Oriental architecture of the most refined quality the world has ever beheld.

The central block is divided by three magnificent courts developed longitudinally north and south. Called the festival court, or court of abundance, the grand court of honor, or the court of the sun and stars, and the court of the four seasons, they are inter-connected from east to west and open in each case to the esplanade and water front. The grand court of honor in the center is the largest, approximating 500 ft. by 900 ft., and is dominated by the great tower on the south side, which rises 400 ft. into the air on the administration building and over the main entrance. Each of the two lateral courts cover approximately 300 sq. ft.

The court of the sun and stars will stand out among the most brilliant architectural expressions of the world's great expositions. It will be distinguished not alone by the majestic scale of its architecture, but by the splendor of its conception and the warmth of its color effects. The tower at the southern entrance will be studded with 50,000 jewels, diamonds, topazes, rubies and sapphires, which will sparkle at night in powerful rays from batteries of searchlights. The beauty of the changing color effects of this immense jeweled mass can scarcely be imagined. Under the play of the lights, emerald greens, turquoise blues, ruby reds and topaz yellows will iridesce with spots of color in the opposite end of the spectrum. Thus in the emerald will be seen oscillating dots of red, and similarly in the other jewels.

These jewels are not colored bulbs; they are actual jewels of the first exposition water. Great quantities are now being made from glass, of a special cutting, cut for different distances and effects, some cut in this country and others cut necessarily abroad. Strangely, glass-cutters and jewelers had never cut anything in these sizes before, and it was so entirely new to them that the illuminating engineers were obliged to figure and measure the index refraction of the glass. It will cost no more to operate the lighting with jewels than with incandescent lamps.

Not only will jewels be used for the gorgeous lighting on the imposing tower gate structure, but also wherever they can add to the beauty of an architectural line or surface or sculptured form, they will be suspended upon delicate springs so that the least vibration from the wind or machinery or even the tramping of feet may keep them in constant motion and set them flashing.

In the vaulted archways of the lofty tower arcade, 125 feet in height, through which visitors may enter the court from the south garden, will be set a series of mural paintings expressing the keynote of the exposition color scheme. The center of the court will be graced with a great sunken garden, five feet below the court level, rich with palms and shrubs and flowers. Two great fountains embracing groups of statuary, one signifying the spirit of the east and the other the spirit of the west, brought together through the Panama Canal, will also lie on the main axis within the court. At night the court will be illuminated from these fountains. They will be constructed of dense white glass, and in the daytime will in no wise suggest light sources. Within each fountain will be concealed seventy-two luminous arc lamps, a total of 144 lamps for the court. At night when lighted the entire surface of the fountain will become luminous, flooding the court with a softly diffused white light.

Perhaps the most impressive feature of the court of the sun and stars will be found in a superb classic colonnade, with columns fifty feet high, extending entirely around the court and surmounted by seraphic figures symbolical of the stars and designed to represent on one side the spirit of the Orient and on the other the spirit of the Occident. These figures, of which there will be 110, will stand fourteen feet high and the head of each will be crowned with a star measuring four feet across. The crowns will scintillate with dazzling radiance, as altogether they will be studded with some 10,000 jewels. The jewels will be lighted from the base of the figure opposite, the beams crossing the court. In the court, however, the beams will be invisible, because the white flood light which fills the court will eliminate lines of demarcation and cause the beams to vanish. In heroic groups like the one which will crown the west entrance of the main court, a group symbolizing the east and containing an elephant bearing an Indian prince in all the splendor of the Burbar, these jewels, added to the coloring of the sculpture will radiate all the sumptuous magnificence of the most vivid dream of the Orient.

Turning west the court of the four seasons will be entered from the court of the sun and stars through a huge commemorative arch, larger in size than the Arc de Triomphe at Paris. It will be surmounted by a group symbolical of western civilization. A great prairie schooner drawn by oxen will comprise the center motif of the group, typifying the advance of Anglo-Saxon civilization across the plains of America to the shores of the Pacific. To the east one will pass through a similar triumphal arch to the festive court, which will portray Oriental thought. The grouping on the arch is a colossal piece composed of camels, elephants and Oriental warriors.

All the noble facades of these magnificent palaces, the massive pieces of sculpture, softly colored, the stately pillars standing against the rich red of their Pompeiian background, the great mural paintings spread across the walls of the patios, even the blossoming reaches of the tropical gardens—all will be made visible by light scientifically chosen that will reveal their true colors in full splendor. In the courts the mural paintings will be lighted by concealed lamps set into the pillars fronting them, a special tubular lamp having been perfected for the fluted columns. The lamp and reflectors are made small enough to insert into the flute on the column. For use on smooth columns, three lamps will be inserted in each at heights of about 10, 20 and 30 ft. and partially concealed by reflectors. The illumination on paintings can be absolutely controlled in intensity and distribution by changing the size of the units and the curv-

ature of the reflecting surfaces; and by introducing colored bulbs, any color effect may be obtained.

Throughout the grounds ornamental luminous arcs will be used and fitted with dense globes, which will reduce the intrinsic brilliancy of the lamp to a point where it may be looked at directly without injury to the eye. The enclosed flame arc lamp is well suited for lighting large inside areas and will be used extensively for indoor lighting, the interior of the buildings being tinted a pearly tone. Both the ornamental luminous and flame arc lamps with heavy diffusing globes will give nearly four times as much light for an equal amount of power as the older types of carbon arc lamps used in previous expositions.

Deep in the lagoons and artistically chosen waterspaces will appear perfect and complete reflections of the brilliant walls and towers of the exposition, not striped with lines of light on areas of shadow but glowing in all the radiant colors and contrasting surfaces which the architect, sculptor and colorist have created for them. And high upon the roofs and towers of the great buildings the symbolical banners and flags will not be lost against the night sky but will be brought out in full value. Extending along the outside of the walks in front of the main exhibition palaces for a distance of nearly two and one-half miles will be placed singly and in groups standards on which will be suspended large banners representing Spanish heraldry in design. They will be made in the exposition colors and three shields will be mounted on each standard. Back of them will be concealed five luminous arc lamps in each case reflecting on the buildings. The banners are being so constructed that the light glowing through them will present from the court drives the marvelously realistic effect of tapestry.

There will be electric fountains, but no water will flash in them. Instead, smoke and steam, much superior media for such effects, will be sent into the air and glow with tints from the rays of the mighty scintillator. A huge locomotive, which can develop enough power to drive it along at eighty miles an hour, will be mounted on a steel turntable and will belch forth against the sky great columns of smoke and steam through which the rays of the scintillator will play. Contrasting delicately with these geysers of color, provided experiments now being made prove successful, thousands of gigantic soap-bubbles will be released from a large blower and float into the air. On these the powerful rays of the scintillator will glisten with the iridescence of an insect's wings. Quantities of cloth balls specially constructed for the purpose will be sent soaring into the air on festive nights and will glow with ever-changing color combinations in the widely projected beams of tinted light.

At the western end of the massed assemblage of exhibit places will be seen the classic outlines of the Palace of Fine Arts, a beautiful example of Italian architecture fronted with a great spacious semi-circular court resembling St. Peter's at Rome. At night its ivory colonnades, drenched in silver radiance apparently from the moon, will be reflected on the surface of the dreamy lagoon in the intervening space between the palace and the main block of buildings. But perhaps the most gorgeous effects of glittering reflection will be realized in the horticultural palace at the left when entering through the southern gardens. Composed most entirely of glass, it will be a veritable crystal palace and at night will rise like a gigantic shimmering bubble of light 165 ft above a fairyland of illuminated blossoms and shining fountains.

The mammoth electric scintillator, which will be anchored on barges in the bay 500 to 600 yds. from the shore, will project out over the entire grounds great beams of colored light variations aggregating over 4,000,000,000 candlepower. This will consist of a battery of forty-eight searchlights having 36-inch parabolic mirrors and representing the forty-eight states. Sixty men will be required to operate the lights and will be trained to direct them through many evolutions of color, throwing brilliant auroras into the sky. On clear nights the spread of these colors will be visible in all the bay cities to a distance of fifty or sixty miles. But mists often roll in from the bay at night, which will greatly heighten the wonderful lighting effects, furnishing a background upon which to play the constantly changing color scheme, and to soften and intensify the lights at will.

That the exposition in its entirety will be made not only a beautiful vision but will leave a lasting impression of its greatness and grandeur on the many thousands of visitors both from this country and abroad is assured. It will be a fitting and adequate expression of the opening of the new gateway to the east and the west. But the impression of newness in expositions, a prominent difference that will charm and linger long with the visitor, will be the combined decorative and lighting scheme, a modern aesthetic achievement, a new "Symphony in Color."

ELECTRIC PLANTS AND TELEPHONES IN CENTRAL CHINA.

BY CONSUL-GENERAL ROGERS, GREENE, HANKOW.

There are three electric light plants at Hankow, one for the Chinese city and two, one of them very small, in the foreign concessions. There is a telephone service operated by the German postoffice in the foreign concessions and a Chinese telephone service in the native city. The Chinese telephone service connects wtih the neighboring cities of Wuchang and Hanyang.

In Wuchang there is a small electric plant, mostly for official use, but I understand that a municipal system is contemplated.

In Changsha, the capital of Hunan Province, there is a fair electric light plant, and there is also a telephone system, though the latter is used by private persons.

In Kiukiang there is no electric light plant. In Nanchang there is a small electric light plant. In both cities there are telephones, but no system that is in general use with any considerable number of subscribers.

It would be exceedingly difficult, if not impossible, for a foreign company to get any public service franchise, and the number of Chinese merchants with whom a joint Chinese-foreign enterprise could be conducted is still very small.

GAS ENGINEERING

DISTRIBUTION OF GAS.—III.

(Concluded)

BY E. C. JONES.

In laying new mains for gas the pipes are of necessity filled with air. This air must be expelled before the main is placed in use. The safest and most economical way to displace the air is to provide a large outlet and open the full pressure of gas on the initial end of the new main. In this way the air is expelled quickly, and the body of air moves in front of the advancing gas with very little mixing of the two.

Matches and open lights should never be used for testing mains or services, and the sense of smell is unreliable. A simple test for determining when the air is entirely displaced by gas in mains, holders, or other new gas apparatus, is made by taking a sample of the mixture in a rubber gas bag. The tube of this bag is then held beneath the surface of a pail full of soap and water, and a portion of the gas mixture is squeezed out of the rubber bag into the soapy water. Bubbles form on the surface of the liquid, and these bubbles may be tested by a lighted match. If there is little gas in the mixture the match will be extinguished, and as the proportion of gas increases the gas and air will explode with increasing and then diminishing activity until the bubbles filled with pure gas will burn slowly with a yellow flame. This is an interesting experiment, but care is necessary to test the samples taken in the rubber bag at a safe distance, and preferably to windward of the main or other apparatus under test, and the tube of the rubber bag should never be lighted. The soap bubbles contain enough of the gaseous mixture for a satisfactory test without danger.

There are three critical points in mixtures of gas and air; when the mixture begins to be explosive; when it is most explosive; and when the mixture burns without explosion.

Oil gas of the following composition

CO_2 =	1.6%
C_nH_{2n} =	6.8%
O_2 =	0.2%
CO =	3.4%
H_2 =	52.1%
CH_4 =	30.8%
N_2 =	5.1%
	100.0%

begins to explode in proportions of 7 parts of gas and 93 parts of air. It is most explosive when the proportions are 15.4 parts of gas and 84.6 parts of air, and the mixture begins to burn without explosion when the proportion is 24.5 parts of gas and 75.5 parts of air.

The increasing popularity of gas, and the large demands on existing low pressure systems, created a condition which required the laying of larger mains or materially increasing the pressure.

A new installation would be expensive and increasing the initial pressure would cause a portion of the district to suffer from excessive pressure in order to supply the consumers at distant points with needed pressure.

Distribution of gas under high pressure was the invention born of this necessity, and by its use low pressure systems which were becoming inadequate have been made amply large, and the benefits of gas supply have been extended to suburban and interurban districts that could never hope for gas service under low pressure conditions. High pressure gas means gas compressed and delivered under pounds per sq. in. instead of inches in water pressure.

The gas men of California did pioneer work in high pressure gas distribution, and the first installation was in Oakland by Mr. John A. Britton, in 1885. This line was for the supply of gas to Alameda, and the pressure carried was up to ten pounds.

The first extensive use of high pressure gas in California was a line of 2 in. steel pipe 16.8 miles long between Santa Rosa and Petaluma. This line was laid in 1902, and for years the city of Petaluma has been supplied with gas depending entirely on this small pipe. There is no gas works in Petaluma, and until quite recently there was no storage holder. The initial pressure was varied according to the demand for gas up to a maximum of 100 pounds.

The first line was laid with standard 2 in. pipe using ordinary couplings for joints, but this was displaced by the present line consisting of steel casing 2 in. outside diameter joined by couplings consisting of a metal sleeve, and two flanges drawn together with bolts and using rubber gaskets between the sleeve and flanges to make gas tight joints. These coupling joints are generally used on high pressure mains, and have proven satisfactory on natural gas lines, but illuminating gas contains enough benzole (which is a solvent of rubber) to attack the rubber gaskets and cause leaks of gas. Dipping the gaskets in a solution of shellac in alcohol and coating the sleeves and flanges with the solution stayed the destruction of the rubber, but this added to the already large expense for a joint that was not entirely satisfactory caused the search for a better way to join tubes.

Again the need was satisfied by a timely invention. The work of welding metals by the oxyacetylene torch had been perfected to a degree which warranted trying it on high pressure gas lines, and during the year 1912 an 8 in. O.D. line of steel tubing about a mile in length was laid in San Francisco with welded joints. At first the welding was slow and required skilled workmen, but in less than a year all obstacles have been surmounted, and welded tubes are now accepted as the quickest, cheapest, and best joint. The work is now done by a portable welding set mounted on a special automobile and the regular main layers do the welding.

In welding 8 in. O.D. casing, which is .185 in. thick, each joint requires 9.25 ft. of acetylene and 16 2/3 ft. of oxygen. At present prices the acetylene for an 8 in. joint costs 18½ cents, oxygen 41 2/3 cents,

and labor, including welding, handling of pipe, and painting, costs 23 cents, making a total cost of 83 1/16 cents per joint. This is less than half the cost of a coupling joint with rubber gaskets, and is gradually being reduced as experience is gained in welding.

The first 8 in. welded joints cost $2.50 each. These were made by acetylene generated from calcium carbide on the work while the acetylene is now furnished in portable tanks containing 500 cu. ft. each.

Heavy and expensive high pressure fittings have now been displaced by welding together steel tubes of any sizes into T's, Y's, or other shapes as needed. These eliminate cast iron from high pressure lines, and they are strong and gas tight. Coincident with the first welding of tubes the mills began the manufacture of tube lengths 40 ft. long, this reduced the number of joints by half as the tubes previously made averaged 20 ft. in length.

Services from high pressure mains need not be so large as low pressure services. Pipes of ½ or ¾ in. diameter are sufficiently large for ordinary consumers. These services are connected to a steel main by means of a clamp saddle over a lead washer. This saddle is fastened to the main by two iron threaded yokes passing under the main and through the saddle, holding it in place, gas tight by nuts. A stopcock is then screwed into the saddle and with the stopcock open, a hole is drilled through the main, the drill passing through the opening in the barrel of the stopcock. After removing the drill the stopcock is closed and the service pipe is run in the usual manner. In this way high pressure connections are made to mains under pressure with very little loss of gas. Each service is provided with a high pressure regulator, which reduces the pressure before the gas reaches the meter to about four inches of water. This is perfect gas service, because the great excess of pressure in the main keeps a constant supply of gas at uniform pressure on the house pipes, no matter how erratic the use of gas may be.

The regulators are dependable and seldom fail to act. The only precaution necessary is to provide a safety tube connected to the top of the regulator and passing out of doors. This is to vent a defective regulator, and avoids the effects of high pressure on the meter and gas fixtures.

High pressure mains are used to re-inforce low pressure systems, either by running spines of high pressure mains through the district or preferably by surrounding the low pressure system by a high pressure loop. This last method was recently applied to San Francisco. A 16 in. O.D. steel tube was laid from the Potrero Gas Works on the south, around the city to the storage holders at North Beach. A pressure of 30 pounds is now carried on this loop, and connections are made between the loop and the low-pressure mains at points where the pressure is low or the demand for gas is great, through district governors which automatically discharge gas at any desired pressure into the low-pressure mains. This 16-inch high-pressure main has its terminal in the grounds of the Panama-Pacific International Exposition, and insures an ample supply of gas and excellent service to meet the gas requirements of the World's Fair in 1915.

The pressure is raised and maintained in high-pressure mains by single or double stage gas compressors. Single stage compression is economical for pressure below 80 pounds per square inch, and for higher pressure multiple stages are used, with intercoolers for taking away the heat caused by compression.

The compressors used are either steam-driven or are belted to steam or gas engines or electric motors. Steam used as motive power has the advantage of variable speed adaptable to varying loads, but when ever possible gas engines should be used with compressors having suitable unloading devices which compensate for varying loads.

The gas manufacturer should use his own product for every conceivable purpose, as it establishes confidence in the merits of gas and is the best form of advertising. The effects of compression on gas is to squeeze out the water and some of the unstable hydrocarbons contained in the gas. The relative humidity of gas in a gas-holder is practically the same as that of the atmosphere, and as gas is compressed the water vapor contained in it is condensed as water, until at high pressure the gas is completely dehydrated.

Provision must be made to care for the water and condensed hydrocarbons and prevent them from flowing into the mains. For this purpose compression tanks usually 6 ft. in diameter and 30 ft. long are interposed between the compressor and the main. These tanks trap the compression liquid, and it may be removed by opening a tap, and the gas pressure in the tank blows it out. It will thus be seen that no pumping is necessary on high-pressure drips as the pressure of the gas forces out the liquids.

The following table shows the physical changes which take place in oil gas when subjected to high pressure:

THE EFFECTS OF HIGH PRESSURE UPON ILLUMINATING GAS.

Pounds Pressure	C_nH_{2n}	CH_4	H_2	CO	CO_2	O_2	N_2	Specific Gravity	B.T.U.	Candle Power	Remarks
	%	%	%	%	%	%	%				
0	7.0	29.7	50.0	5.2	3.0	Tr.	5.1	.413	626	21.6	H_2S-200gr.
30	6.8	29.8	50.1	5.4	2.8	Tr	5.1	.411	625	20.0	
60	6.8	29.6	50.2	5.5	3.1	0.1	4.7	.412	624	17.0	
90	6.8	29.6	50.3	5.5	3.1	Tr.	4.7	.411	624	16.0	
120	6.7	29.5	49.2	5.6	3.2	0.1	5.7	.422	618	15.0	
150	6.7	28.8	51.3	5.5	3.3	0.1	4.3	.407	617	14.0	
180	6.5	29.0	51.0	5.5	3.0	Tr.	5.0	.407	615	11.1	
210	6.0	29.0	51.0	5.7	3.2	0.1	5.0	.408	607	9.6	
240	6.3	29.0	51.0	5.4	3.2	0.1	5.0	.408	611	10.8	
270	6.0	29.1	51.6	5.6	3.2	0.1	4.5	.403	610	6.2	
300	5.7	30.0	51.4	5.6	3.0	0.1	4.2	.399	614	5.5	H_2S-None

E.C. Jones

In making these experiments it was discovered that compression of gas besides removing the water vapor, causes a continuous reduction of candle power, due to the squeezing out of the benzole contained in the gas. And if the pressure is raised to 300 pounds

there is a total elimination of naphthalene and sulphuretted hydrogen. It is thus possible to dispense with purification of gas if it is compressed to 300 pounds, as compression performs all the functions of the purifiers as well as removing naphthalene and water vapor. At 120 pounds pressure the sulphuretted hydrogen was reduced from 200 grains to 70 grains per 100 cu. ft of gas.

The compression liquid flows with the gas into the compression tanks, and if the gas which has lost some of its candle power during compression is permitted to come into slow contact with the compression liquid, it will absorb enough of the benzole to restore its candle power, but it will not take up any of the condensed naphthalene or sulphuretted hydrogen.

High pressure gas distribution has many advantages over low pressure, inasmuch as there are no stoppages caused by naphthalene or condensed water, and the manner of laying the mains and the severe tests to which they are subjected before being used makes them practically gas-tight and reduces the loss by leakage.

Satisfactory distribution of gas is fully as important as the quality of the gas supplied. Piping that is too small or badly drained, and low or uneven pressure is often called poor gas, and it is difficult to convince a consumer as to the cause of the complaint. Good service is the result of well-balanced distribution, and the chief aim of every gas company today is to furnish perfect service to the consumers.

MACHINERY EXHIBITS AT THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION.

Rapid progress is being made in the construction of the main exhibit buildings at the Panama-Pacific International Exposition at San Francisco. The first of the buildings is now completed, and five other structures are under way. There will be fourteen main exhibit buildings all told, and contracts will be let upon the remainder to bring all to completion by July, 1914. Work upon the Machinery building, the largest of the exhibit group, was begun early in the year, and the framing of the main portion of the structure is partly completed. This will permit the complete installation of exhibits by the opening date, February 20, 1915. The Exposition management plans a record not only in construction, but by presenting a finished spectacle on the opening day.

The department of machinery exhibits is thoroughly organized, and filings for exhibit space have been received to an extent that assures a display commensurate with the importance of the industry. Early applications are especially welcomed by the Panama-Pacific management, and will facilitate the proper grouping of the exhibits and the perfection of other arrangements essential to the interests of exhibitors as well as to the Exposition.

For the information of the exhibitors the following brief data has been issued by the Exposition company:

The Machinery building will have nearly eight acres of floor space. In addition there will be an auxiliary structure to be known as the Gas and Fuels building. Electrical machinery, instead of being placed in a separate building, will be located in the Machinery building and classed under the general heading of machinery. All parts of the building will be served by adequate crane facilities. Electric current, alternating and direct, gas and water, will be available in any portion of the building; compressed air and steam will be provided in a section adjacent to the Gas and Fuels building. General illumination is to be provided by the Exposition company, but a nominal charge will be made to exhibitors for other utilities service they desire. Special rates for power will be made to exhibitors who use it to show machinery in motion.

The floor of the Machinery building is designed for a load of 200 pounds per square foot. The soil conditions will permit adequate foundations for heavy machinery to be readily constructed. No charge will be made for space.

The management urges that concerns and individuals desiring to participate lose no time in getting into touch with the Exposition company and filing applications for space.

Copies of the rules and regulations, documents as to the classification of exhibits, blank applications for space and other information prepared for the guidance of exhibitors will be promptly forwarded on request to the Panama-Pacific International Exposition Company, San Francisco.

"OLD SOL WORKING OVERTIME."

While the business man who is seized with fright every time he hears the tariff discussed, while the banker is complaining that we haven't a currency sufficiently elastic, and while the average citizen feels a mood of economy stealing over him, nature seems unperturbed and is working overtime to shower blessings on all sides. Old Sol is blessing Mother Earth with his rich and warm rays in a sacrificial effort to give us a bountiful harvest this fall, and thereby arouse frail human nature from its pronounced case of dejection and the pip.

They may cut the tariff if they wish to, they may give the nation a better currency system, but no congress can stop old Sol from making the earth give forth an unusual bounty of riches in the form of bumper crops.

The first crop report published this week is a real tonic for whatever depression envelops us now. It is out of the earth the new wealth comes each year, wealth that must be moved and consumed. If nature's moods do not go awry before the harvest we may confidently look for new yields which will exceed Hill's great dream of $9,000,000,000.

Imagine what this wealth means to commerce of this country. Think what it represents to the prosperity of the nation.

It will be crops, nothing else, which will prove the saving situation for this country next fall. We may then have so much money as to become even indiscreet enough to buy automobiles. And the soup houses about which we hear the croakers talk so much will again fade away as a mere memory of 1893.—The Financial World.

ELECTRICAL PUMPING AND IRRIGATION

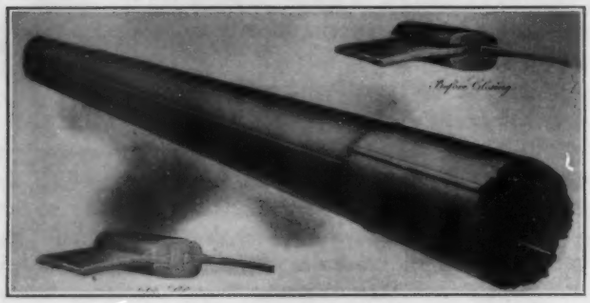
PRESSURE PIPES FOR THE CONVEYANCE OF WATER AND FOR INVERTED SIPHONS.

BY B. A. ETCHEVERRY.

Pipes are used for irrigation as pressure pipes to cross depressions in the form of inverted siphons, and for the distribution of water as described later. For irrigation purposes pressure pipes are made of wooden staves, steel, and reinforced concrete. Plain concrete pipes are used only for low pressures. Cast iron pipes are seldom used because of their high cost in the West and of difficulties of transportation. Steel or iron pipe is not as durable as cast iron pipe but is much lighter, which is an advantage as regards transportation and cost. For pressures under 200 ft. wooden stave pipes are usually more economical and for pressures under 100 ft. reinforced concrete pipe will often be more economical because of its durability.

Steel and Iron Pipes.

Steel and iron pipes are made in sections of sheets usually joined by riveting, welding, etc. Riveted pipes may be spirally riveted, longitudinally lap riveted or butt riveted. A type of steel pipe originated in Australia, has a very efficient type of joint. The joint is a lock joint formed by upsetting the plates slightly at the edges, inserting these longitudinal edges in the grooves of a double grooved locking bar, and closing the grooves by hydraulic press. The joints to connect the sections may be riveted, slip, flange or bolted expansion joints. The thickness of the pipe must be sufficient to not only resist the tensile stress but must be made thick enough for stiffness and to allow for rusting.



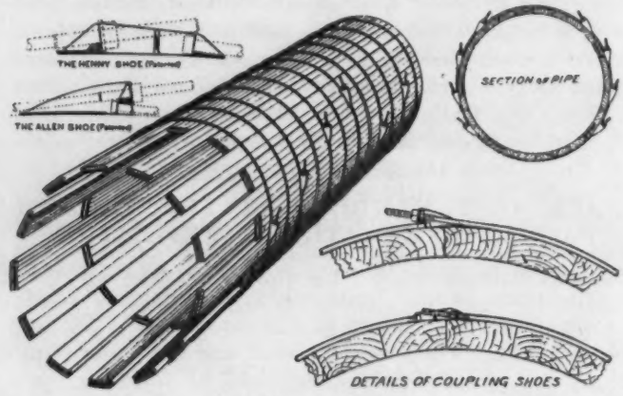
Steel Pipe With Lock Joint.

If S = allowable stress per square inch.
p = total pressure per sq. in., allowing for water hammer.
r = radius of pipe in inches.
t = thickness of pipe in inches.
e = efficiency of joint (60 to 70 per cent for double riveted pipe, 100 per cent for lock-bar pipe.)

$$\text{then } t = \frac{1}{e}\,\frac{pr}{S} + \frac{1}{16}$$

Wooden Stave Pipe.

This pipe consists of staves formed with radial edges and bound tightly together by means of round or oval bands of steel or iron spaced and sized according to the pressure. The pipes may be made continuous and built on the ground or may be made in sections at the factory. The bands for continuous pipe are hoops fastened at the ends by shoes and nuts which permit tightening of the bands. The bands for the pipe built in sections consist of wire wound in a spiral. Two independent spirals are sometimes used. This is preferable, for should one wire break the pipe will be held together. The staves for the continuous pipe usually break joints and are joined at the ends by inserting a metal tongue. The staves are made of clear wood, either of California redwood or Oregon fir. The size of the staves varies from 1 x 4 in. to 2½ x 8 in. The pipe built continuously is generally used for large size pipes above 24 in. in diameter up to 120 in. The wire wound section pipe is manufactured in sizes from 2 to 24 in. One end of the section is made beveled and the other end is surrounded with a wire wound wooden collar which forms a bell. The wire is generally galvanized steel. Very sharp curves are made by using cast iron elbows with bell ends. For curves of greater radius the wire wound short sections are made. For continuous pipe the staves can be sprung to fit the curve when the radius of curvature is greater than 200 or 300 ft. Connections and gate valves are made of cast iron fittings with bell ends and the joints are made with oakum and lead. Small fittings, such as air valves or small wrought iron pipe takeouts, can be screwed directly in the staves.



Wood Stave Pipe.

Design of Staves and Bands.

The principles on which the design is based are the following:

1. The staves must be thin enough to secure complete saturation and to deflect readily to the degree of curvature employed. They must be thick enough to prevent undesirable percolation.

2. The bands must be of such size and so spaced that the bands will resist all strains coming on them and not crush the fiber beneath them. The spacing must not exceed a certain maximum. For staves made of 2 in. lumber the maxium spacing adopted is from

10 to 12 in., varying with the diameter of the pipe. For staves made of 1½ in. lumber the maximum spacing is 10 in. The bands must resist (a) the stress due to water pressure, (b) the stress necessary to give a degree of compression per sq. in. between the staves in excess of the water pressure, and (c) the stress due to swelling of the staves.

The size of the band and the spacing are related. When properly designed bands should be of such size and so spaced that the band will be strained to its safe resisting value and the bearing pressure on the stave will be equal to the safe bearing value of the wood. When not properly designed the spacing may be correct for the strain on the band but may produce an excessive bearing force on the stave. On the other hand the band may be designed for correct bearing pressure but the spacing may cause excessive strain on the band. The equations expressing these relations for the correct design are obtained as follows:

Let R = internal radius of pipe in inches.
r = radius of band.
f = spacing of bands.
P = water pressure in pounds per sq. in.
S = safe strength of band = $\pi r^2 S$.
E = swelling force of wood per sq. in. between staves.
t = thickness of stave.
s = safe tensile strength per sq. in. of band steel.
e = safe bearing power of the wood per lineal inch of band.

Size of Bands.

For a pipe of a given diameter there is corresponding correct size of band to use; this band is the one which when strained to its safe strength will sink sufficiently into the stave to produce a bearing pressure equal to the safe crushing strength of the wood. The bands will sink into the wood depending on the stress in the band. The width of contact before the fibres are crushed beyond safety has been found to be about equal to the radius of the band. The ultimate crushing strength of wood is from 1000 to 2000. The safe stress is usually taken as 650. The stress in the band corresponding to the bearing pressure e or 650 r is $S' = (R + t)\, e = (R + t)\, 650\, r$.

S' should be equal to the safe strength of the band which is equal to $\pi r^2 s$.

$$\text{Therefore } (\pi r^2)\, s = (R + t)\, 650\, r;\ r = \frac{(R + t)\, 650}{\pi s}$$

The ultimate strength per sq. in. of steel is about 60,000 pounds, assuming a factor of safety of 4 the safe strength is 15,000 pounds per sq. in. of band cross section. For this value of s $r = .0138\ (R + t)$.

Spacing of the Bands.

The forces which the bands must resist are:

1. The water pressure which causes a stress on the band equal to PRf.

2. The swelling of the staves which causes a stress on the band equal to ftE.

3. The necessary compression between the staves to prevent leakage at the joints. The compression between the staves must be greater than the water pressure or water will be forced out at the joints. The swelling of the staves will produce some compression, but an initial compression is necessary to supplement the swelling compression and to act when the pipe is first used before the swelling of the staves. Assume that this initial unit compression is made 3/2 of the unit water pressure; then the stress produced on the band is 3/2 Pft.

Economic Proportions for Stave-Pipe Design (By Arthur L. Adams.)

Nominal diameter of pipe inches.	Stock sizes for staves in inches.	Thickness of finished staves inches.	Oval. Economic sizes of bands, inches.	Working stress in band S. Pounds.	Factor of safety in band.
10	1 1/2x4	1 1/16	5/16x7/16	1255	5.26
12	1 1/2x4	1 1/8	5/16x7/16	1475	4.47
14	1 1/2x4	1 3/16	5/16x7/16	1650	4
16	2 x6	1 7/32	5/16x7/16	1650	4
18	2 x6	1 3/8	5/16x7/16	1650	4
20	2 x6	1 3/8	5/16x7/16	1650	4
			Circular.		
22	2 x6	1 3/8	3/8	1508	4.4
24	2 x6	1 3/8	3/8	1650	4
27	2 x6	1 7/16	3/8	1650	4
30	2 x6	1 1/2	1/2	2673	4.4
36	2 x6	1 9/16	1/2	2950	4
42	2 x6	1 5/8	1/2	2950	4
48	2 x6	1 11/16	1/2	2950	4
54	2 1/2x8	2 1/8	5/8	4600	4
60	3 x8	2 1/2	5/8	4600	4
66	3 x8	2 9/16	3/4	6600	4
72	3 x8	2 5/8	3/4	6600	4

The spacing of the bands must be such that the total stress due to these three forces is equal to the safe strength of the band (or the stress on the band corresponding to the safe bearing pressure of the band on the staves). Therefore,

$$S = \pi r^2 s = PRf + ftE + ft\frac{3}{2} - P \text{ or } f = \frac{S}{PR + tE + \frac{3}{2}tP}$$

E is commonly assumed to be equal to 100. Usually either the swelling force of the stave or the initial compression is neglected. The equation then becomes:

$$f = \frac{S}{PR + 100t};\ \text{or } f = \frac{S}{PR + \frac{3}{2}tP} = \frac{S}{P\left(+\frac{3}{2}t\right)}$$

For large size pipes and high heads the terms 100 t and 3/2 t are relatively small and the equation may be written: f = S/PR. S is obtained from the above table.

Advantages of Wooden Stave Pipe.

1. It is cheaper than steel pipe.

2. Except for the bands it is not subject to corrosion and the bands can be well coated with asphalt.

3. It has a greater carrying capacity than a riveted steel pipe of the same diameter. The coefficients of roughness for use in Kutter's formulae are, for clean riveted pipe .015 and for wooden stave pipe .012.

4. When kept well saturated its durability is probably greater than that of steel pipe.

5. It is not affected by the heat, while steel pipe requires to be laid in a trench and covered or will need to be anchored or expansion joints provided.

6. It is not affected by cold and will probably not be damaged should the water in it freeze solid.

Disadvantages.

1. If not kept saturated its life is very much shortened.

2. Unless laid in a trench and covered it is liable to destruction by fires.

LOCATING FAULTS IN UNDERGROUND CABLES

THE VARLEY LOOP—III.

BY C. A. GAINES.

By introducing a known resistance in series with the cable in the Murray loop test we have the connections for the Varley loop. The common Wheatstone bridge set, in which the terminal of the battery, usually attached at "C." can be removed and connected to one of the cable conductors, or to the ground, as the case may require, is more satisfactory for this test than the slide wire bridge. Let "A" and "B" be the two ratio arms of the bridge, "R" the adjustable re-

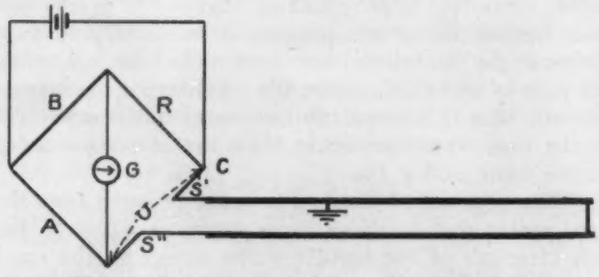


Fig. 1. Measuring Resistance of Loop "U."

sistance "X" the resistance to fault, S' and S" the resistance of the two leads, and "L" the length of the cable in feet. Using the bridge with battery connected to "C," as in Fig. 1, the resistance "U" of the cable loop and connecting leads is first obtained by the equation $U = AR/B$.

Switching the battery terminal from "C" to the ground, as in Fig. 2, we obtain a balance by adjusting the different arms of the bridge until there is no deflection of the instrument needle.

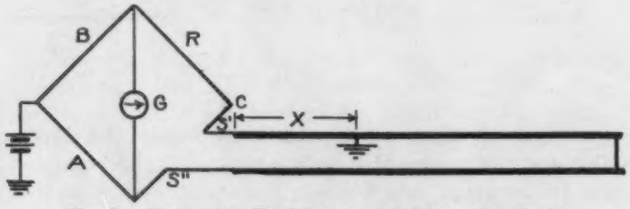


Fig. 2. Measuring Resistance of Cable to the Fault.

Then, $X = \frac{BU - AR}{A + B} - S'$ in which X is the resistance of the faulty conductor from station to fault.

It now remains to obtain the resistance of the entire length of the faulty conductor, which we will call "W." With two good wires this can easily be

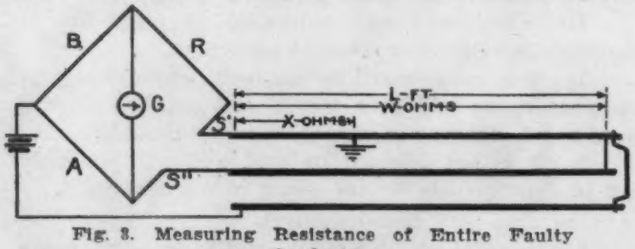


Fig. 3. Measuring Resistance of Entire Faulty Conductor.

done by a further application of the Varley loop principle, in which the second good wire is used for one of the battery leads, as in Fig. 3, and when a balance is obtained.

$$W = \frac{BU - AR}{A + B} - S'$$

After obtaining both "X" and "W" the distance to the fault in feet is

$$\frac{X}{W} L$$

As an example of the use of the Varley loop method of testing, we will consider an actual case which came under the writer's observation. The resistance of the lead S' was found to be .018 ohms and the resistance of the loop "U" to be .215 ohms. In determining the resistance of the faulty conductor from the station to the opposite end a balance was obtained with

$A = 10 \qquad B = 1000 \qquad R = 11$

$$W = \frac{BU - AR}{A + B} - S' = \frac{.215 - 110}{1010} - .018 = .086 \text{ ohms.}$$

In finding the resistance to the fault the values when a balance was obtained were:

$A = 10 \qquad B = 1000$ and $R = 14$

"X" is therefore .056 ohms.

From the map records we learned that the particular piece of cable under test was 1650 ft. long.

The fault must then be $\frac{.056}{.086} \times 1650$ or 1070 ft. from the testing station. This came between two manholes, in each of which we cut the cable and then replaced the defective length between the two holes.

An ammeter and voltmeter can be used to locate a fault by connecting as shown in Fig. 4. The current is first sent over the entire length of the faulty conductor and the drop in volts "W" read from the volt-

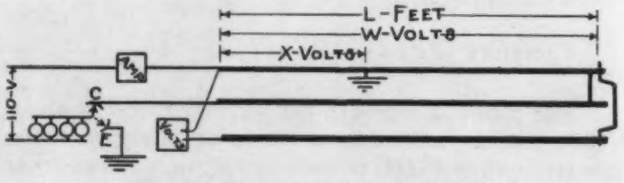


Fig. 4. Voltmeter and Ammeter Method.

meter. Next by changing contact from "C" to "E" we send the current over the faulty conductor as far as the fault, and the drop over this portion of the cable is read from the voltmeter. Call this drop "X." Then if the current through the ammeter has been kept at the same value in both tests the distance to the fault in feet is equal to XL/W.

If the two ammeter readings cannot be made equal and "A" is the current when the drop "W" was obtained, and A_0 the current when X was obtained, then

W/A_1, equals the resistance of the entire conductor and X/A_2 equals the resistance to the fault, then

$$\frac{A_1\ XL}{A_2\ W}$$ is the distance to the fault.

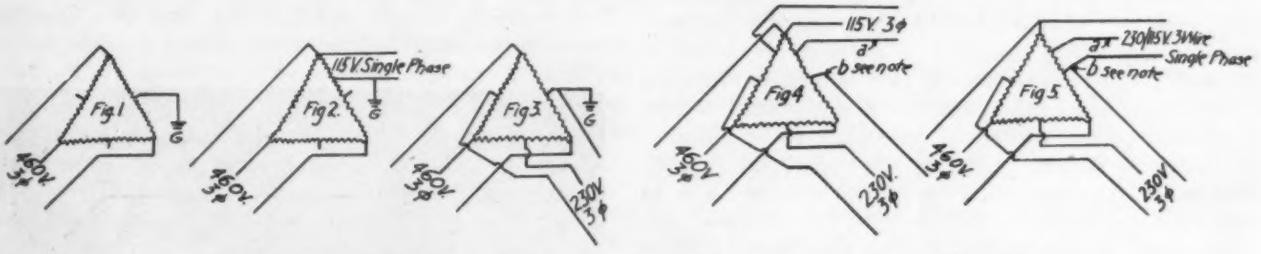
A very convenient set of tables can be made giving the length of the different cables with the distance from each end to every manhole where the cable appears. These distances are also given in per cent of the total length to simplify the calculations with the slide wire bridge. The following is a portion of one of these table.

Power House Cable No. 10: Length 14532 Ft.: Size No. 2/0.

M. H. No.	Location.	L&—A	%—L	L"—I	%—L
5147	Sta. "A"	301	2.1	14231	97.9
5146	Bet. Mich. & Geo. Illinois.	560	3.9	13972	96.1
5146	Bet. 22d & 23d.	959	6.6	13573	93.4
5144	Illinois	1421	9.3	13111	90.2
5143	Kentucky	1674	11.5	12858	88.5
	Kentucky.				
5142	1-N-22d	2079	14.3	12453	85.7
5141	2-N-22d	2481	17.1	12051	82.9
5140	1-N-20th	2885	19.9	11647	80.1
5139	1-N-19th	3285	22.6	11246	77.4
5138	1-N-18th	3642	25.1	10890	74.9

GROUNDING OF SECONDARY CIRCUITS.

The National Electric Code Edition of 1913, will make grounding of transformer secondaries mandatory, consequently some of the standard methods employed by power companies will be of interest. The Central Colorado Power Company has been grounding secondaries with good results for several years under the following instruction to consumers:



Diagrams of Grounding Connection of Secondary Circuits Less Than 500 Volts.

All transformers connected to distribution circuits of less than 500 volts rating must have their cases thoroughly grounded and the secondary circuits must be grounded with sufficient capacity to blow the primary fuse of the installation. The point of the winding to be grounded is shown by the accompanying drawing for several arrangements of transformers.

Fig. I shows the middle point in one transformer grounded, thus giving a maximum potential to ground of 230 volts from each of two wires and 396 volts for the other wire.

Fig. II, the maximum potential to ground on the lighting circuit is 115 volts. On the three wires of the motor circuit the potentials to ground are respectively 115 volts, 345 volts and 413 volts.

In Fig. III the potentials to ground on the 460 volt three-phase circuit are respectively 230,396 and 230 volts. On the 230 volt circuit the potentials to ground are respectively 0, 230 and 230.

In Fig. IV, the potentials to ground on the lighting circuit with the ground connected at a are respectively 0, 115 and 115 volts.

With the ground connected at b, the potentials are respectively 115 volts, 230 volts, 199 volts. Therefore, in cases where the three-phase lighting circuit is taken out of two transformers and it is desired to afford the lighting circuit better protection than is provided for the motor circuit, the ground should be connected at a.

On the motor circuits, the potentials to ground on the 460 volt circuit with the ground connected at b are the same as in Fig. I. The maximum voltage to ground is increased slightly if the ground is connected at a. In general it will be advisable to ground the point a when this connection is used.

In Fig. V the potentials to ground on the three wire single-phase lighting circuit with a grounded are respectively 115, 0 and 115 volts. With the point b grounded, the potentials become 0, 115 and 230 volts.

With the point b grounded, the potentials on the motor circuits become as in Figs. I and III.

With the point a grounded, the potentials become 345, 115 and 413 on the 460 volt circuit, while on the 230 volt circuit the potentials to ground become 115, 199 and 304 volts.

In case the secondary winding of the transformers is star connected and the voltage of the secondary circuit is less than 500 volts between wires, then the neutral point of the star connection will be grounded.

The circuits may be grounded to the same ground connection that is connected to the transformer cases, but neither connection should have the same ground as the primary arresters. The exception to this is that both systems of ground connection may be made to the same water system, provided the water system is thoroughly grounded between the points of connection for the primary arresters and the secondary circuits.

The secondary ground connections should be made to a thoroughly grounded water pipe system or to a first class ground plate installation, or, if that is not available, three pipes not less than 1 in. diameter may be driven into the ground not closer than 10 ft. together, each pipe not less than 5 ft. long. The ground wire should be connected to each pipe independently.

The ground wire and all its connections at the transformer must be installed to insure its greatest possible safety from mechanical danger.

READINESS TO SERVE METHODS

CITY VS. COUNTRY BUSINESS.

BY R. B. MATEER.

From a central station viewpoint, the superiority of one class of consumers over another, is dependent on the net cash return per dollar of expense occasioned by investment in and maintenance of a distributing system. Therefore, whether it is to be the policy of the utility to extend its overhead system to rural districts for agricultural business or reinforce its present

Rural Home, Electrically Equipped.

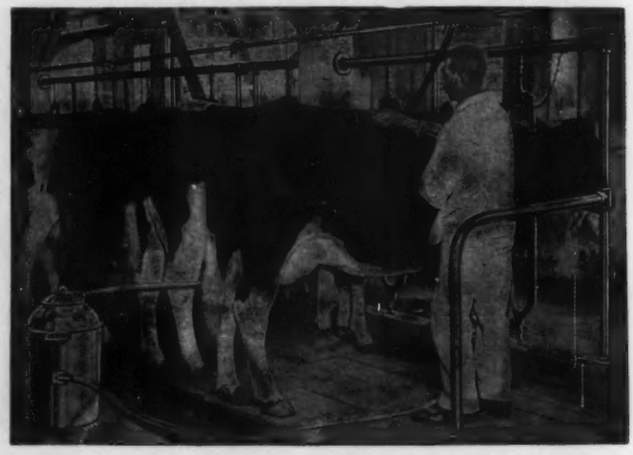
system for additional commercial or residential customers, can only be definitely decided when the applications of current consuming apparatus for the farm are balanced against those practical for the average residence and shop.

Consider, if you please, the rural home surrounded with from ten to one hundred acres and the city residence. On either property a comfortable house is erected. The interior wiring is arranged for lighting and power consumption, metered at one point. Ornate electroliers, table and stand lamps, are to be found in the various rooms. Chafing dish, percolator, grill, water heater, range, refrigerator, washing and ironing machines, luminous electric heaters, electric pads, vacuum cleaner, library sets, sealing wax heaters, cigar lighters and pyrographic needles are to be found, instantly available for use and with a total demand at any one period, not in excess of four kilowatts, and an average monthly revenue of $9. It is true that rural business of such a character occasions a greater cost to the lighting company, than the home so equipped in the city, yet it is apparent that only a very small increase, if any, is to be expected in succeeding months statements as rendered to the city resident, while in the country, the field for additional current consuming apparatus is without limit. In the barn, rectifiers are installed for charging the batteries of the runabout, the farm truck, and the ignition battery, used on gasoline propelled lawn-mowers. Motors for operating hay hoists, grain conveyors, feed cutters, wood saws and grinding machinery are placed overhead, yet easily controlled by the auto-starter or knife blade switch. In the dairy are found electrically operated milking machines, separators, churns, fans, refrigerators and water heating apparatus satisfactory, reliable and possessing cleanliness unsurpassed.

In the field is found the pump for irrigation and reclamation purposes and at the house, the motor operated fire pump, both of which insure the estate against loss, the first by drought and the second by fire. And the premium,—only that charge per annum which varies from twelve to sixteen dollars per horsepower maximum demand. Insurance of such a character renders the farmer independent of the elements and places him at a small expense in a position to secure the largest return from his land.

To supply service for the farm including the residence, barn, dairy and pump house transformer capacity of only 20 h.p. is necessary, insuring to the power company, a revenue of $700 per annum or $35 per kw. of transformer capacity. The revenue here noted is that of the first twelve months succeeding the installation and it is reasonable to presume the second year will witness an increase in consumption equal to 60 per cent, with an additional revenue equal to 40 per cent of the first year or approximate a monthly total of $50 per kw. capacity of transformer.

The only reasons for this rapid increase in current for agricultural purposes are the improvement in county roads, the automobile, the extension of telephone, rural delivery and electric service, keeping the farmer in touch with the world's modern progress. With necessities and luxuries at hand, the farmer today is not the isolated individual, but the intelligent business or professional man, the lawyer and the college graduate, who is attracted to the country by its independent, healthy outdoor life, and the financial returns possible by scientific farming. To secure



Electrical Milking.

profitable rural business, service extensions should not be retarded by those who have grown up and prospered in a community, yet fail to recognize their obligation to aid in building up enterprises, that will give comfort and happiness to the producing population.

A few of the many points in favor of the sales of current for agricultural purposes, are:

1. Revenue per annum in excess of that of the average city residence.

2. Assurance of an increase in revenue each year as compared with the fluctuation in annual receipts of the urban consumer.

3. Permanency and stability of agricultural business as evident by the few changes in the consumers record at the office.

4. Prompt payment by the farmer of statement rendered.

5. Maximum long hour consumption in summer when the power company can best supply service.

6. Elimination of the bug-bear, the winter peak.

7. The fertile field for the introduction and general use of current consuming apparatus.

8. Minimum of accounting expense by the elimination of charges arising from delinquent accounts, and the absence of numerous shutoff and turn-on items.

9. Few complaints on service.

Analyze your business, not only with reference to the revenue per annum per kilowatt demand, but with relation to the future business assured where service lines are constructed and it will be apparent that agricultural and industrial development present possibilities far in excess of that of a commercial and residential character.

AMERICAN ELECTRICAL SUPPLIES IN JAPAN

[Consul General Thomas Sammons, Yokohama.]

The sale of American electrical machinery and supplies in Japan during 1912 was the largest in the history of this line of business in the Empire. The total sales of electrical supplies for the year aggregated over $5,000,000, the bulk of the imported products coming from America. The importation of all kinds of machinery into Japan increased about $1,500,000 during 1912, the total, in round numbers, being $14,150,000.

There are in Japan several British manufacturers who have a fairly large electrical business, but the Allgemeine Company and the Siemens-Schuckert Company are the two large German competitors of the American manufacturers of heavy electrical machinery and supplies.

The principal business during 1912 consisted of the extension of existing light, power, and railway stations. The Tokyo Municipal Railway, for instance, purchased $300,000 worth of apparatus for transforming high tension current in their various substations throughout the city to the trolley voltage.

Electric Water Power Plants—Osaka a Center for Electrical Business.

The machinery ordered about a year ago at Tokyo for various large water power electric companies has been arriving during the past few months and the plants are being completed.

At Yokohama a 3000 kilowatt steam turbine generator was installed to further increase the capacity of the existing lighting plant.

At Osaka there have been many additions to the existing electric railway plants and some small suburban roads have been put into operation in the last four or five months. Osaka is a very active center for the electrical business in Japan, and many suburban roads have been successfully put into operation there. On account of the large manufacturing interest developed, electric power will be largely used there in the future, and as there is a large water power company, the Ujigawa, which is now nearing completion, and which will bring into Osaka 30,000 to 40,000 kilowatts of current, the prospects are favorable for low cost of light and power in that city in the future.

Other Buyers of Electrical Machinery—Business of General Electric Company.

The Kyushiu Electric Railway added during 1912 a 3000 kilowatt turbo-generator set, and at Nagasaki two 500 kilowatt turbo generator sets were installed as an extension to the existing lighting plant. The coal mines in Kyushiu have also been active in purchasing electrical apparatus.

The major part of the sales reported have been made through the General Electric Company of America. In addition to the extensive business of selling American electrical machinery, the General Electric Company is a leading factor in the electric lamp supply trade in Japan. It has developed a very large lamp manufacturing plant at Tokyo, which now supplies the great bulk of the incandescent lamps used in the empire. This plant is operated through a Japanese company under American control. It is managed entirely by Jananese, however, and the operatives are largely Japanese girls. It has been very successful both financially and in supplying the demands of the country. In fact this is a new industry created in Japan within the last three or four years.

The General Electric Company also owns a considerable interest in the Shibaura Engineering Works at Tokyo, which is controlled by the financially powerful Mitsui Company. The Shibaura works manufacture electrical apparatus up to 2000 kilowatts, and the business for the past six months was so satisfactory that the company has decided to increase its capital from the present $1,000,000 to $2,000,000 to take care of the demands of the market here. There is close cooperation between this company and the parent General Electric Company of Schenectady, N. Y., and there is apparently no reason why this Japanese electrical manufacturing concern should not become very strong and prosperous here. All of its products are manufactured in accordance with American designs of the General Electric Company.

Large quantities of the smaller electrical supplies are imported into Japan, and in this business American manufacturers and importers participate very satisfactorily. It is evident, however, that the Japanese will be able, particularly through foreign associates, to manufacture the greater part of the smaller electrical supplies, including telephones and telephone equipment. The manufacture of this class of small electrical products in Japan is growing steadily and rapidly.

ABSENCE OF ELECTRIC SIGNS IN FRENCH CITIES.

Although electricity is quite cheap here—from 1 to 10 cents per kilowatt hour—and although electric lights and power are quite common, there is not a single electric sign either stationary or "talking" on the shopping streets of Marseille. There ought to be a good trade in these articles.

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POWER AND GAS

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Changes of advertising copy should reach this office ten days in advance of date of issue. New advertisements will be accepted up to noon of Monday dated Saturday of the same week. Where proof is to be returned for approval, Eastern advertisers should mail copy at least thirty days in advance of date of issue.

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The Power of Salesmanship

Every man at some time in his career is a salesman, whether of such material things as electric irons or of such intangible values as electric service or even his own services. As such, every one can profit much by reading the remarks on salesmanship published elsewhere in these columns. They are "hot off the bat" from one who has proved by practice the truth of what he preaches.

Sales methods are gradually being classified into a science of salesmanship—a science of cause and effect. A sale follows as the effect of certain causes as naturally as does an electric current. Indeed the act of making a sale has many points in common with that of generating electric current.

Dynamic thoughts, impulses to action, can be generated by the power of suggestion and can be transmitted against the buyer's mental resistance so as to do the work of attracting attention, creating confidence, inducing interest and pulling purchasers.

The power of salesmanship is now being applied to increasing the business of central stations. Great results should follow this action, particularly along the excellent lines which have been adopted by the Society of Electrical Development, under the new slogan, "do it electrically."

Fixing the Resale Price

The legality of price fixing is one of the most momentous questions now pending before the courts. The opponents of this practice claim that it is conspiracy in restraint of trade and adds to the increasingly high cost of living. Its advocates stand on the ground that the maker has the right to name the price at which his product shall be sold.

Like many another good thing in life, the evil in this custom resides not in its use, but in its abuse. When a retail price is ostensibly and ostentatiously fixed at an exorbitant figure so as to allow an opportunity for dickering, the business is more crooked than the proverbial ram's horn; its very deviousness deceives the unskilled buyer. But when the retail price is scrupulously maintained as established and published, all consumers are equally protected.

The important point is that the prices be published, so that goods can be sold on the basis of merit as compared to price. Truthful publicity is the keynote of the new competition, based upon excellence, justice, fair dealing and the approval of a discriminating public. Price-fixing by the manufacturer who advertises builds the finest and the fairest competition the world has ever known. Like the quality of mercy, it is not strained; it helps him who makes and him who buys. It insures a fair profit to the manufacturer and the retailer, a living wage to the workman and equal treatment to all consumers.

Then, again, there is the moral effect of stifling individual effort and initiative. If price-fixing is to

be made a crime, punishable by fine and imprisonment, whereas price-cutting has long been penalized by business suicide, why be a manufacturer, why make things that make for progress, why provide work for the world's workers? Freak law-tinkerers and inconsistent courts may temporarily obscure the issue by reversing the current through the intensified arc of truth, but an awakened people will then the more easily discover and right the error.

Nature's Lesson to the Engineer

The modern engineer has been so busily engaged in studying "the sermons in stones," in developing the latent powers of inanimate nature, that he has sadly neglected the biblical admonition "to consider the ant." Insect life has found better solutions for many a problem than has all the much boasted skill of the engineer. The ant, in addition to being a most advanced exponent of sociological reform, is a tunnel engineer of no mean attainments. On the basis of size comparison, ant structures, both above and below ground, rival any that the structural engineer has yet designed.

Consider also the spider, one of the most repulsive of insects, the comparative span of whose web transcends that of the greatest of man-built suspension bridges. Surveying and astronomy owe a deep debt to this humble hermit, for after many years of experience the astronomer has found the spider-line to be the only cross-hair which combines the necessary fineness with the requisite strength, elasticity and ability to withstand variations in temperature. The spider line is the original "squirted filament" consisting of thousands of microscopic streams of fluid uniting to form a single thread. It is for this reason that it remains true and round under the highest magnifying power.

The hexagonal cell of the honey-comb of the bee is the model for one of the strongest structures known to the engineer. The stream lines in the bodily form of a fish or bird have furnished the naval architect and the aviator with many an idea embodied in aerial or water craft.

Engineers, however, by their continual struggle against the forces of nature have avoided one failing of which the bird has been accused. The locomotive superiority over the ordinary terrestial creature imparted by the power of flight, although a source of great happiness to birds, has lightened their burden of life and perhaps has dulled their wits. Instead of developing a large brain, they have dissipated their energy in flight, song and gorgeous plumage. In this respect, then, birds may be said to form a back-water in the stream of evolution, whereas the engineer is in the forefront of the flood.

It is to the competition of the fire-fly and glow-worm, though, that the engineer must surrender all laurels. Light, without sensible heat, and an efficiency of nearly one hundred per cent, completely eclipses the most brilliant effort of the illuminating engineer in liberating the pent energies of the sun, of which the light of the glow-worm hidden in the grass the gleam of the Noctiluca, disturbed by the ship's keel, or the sudden luminous expulsion of the deep-sea crab are but manifestations.

From a material point of view, modern life owes much to a study of such apparently trivial subjects as these. Witness the marvelous results which have followed Galvani's experiments with the legs of a frog or the evolution of a toy magnet into a turbo-generator. The immediate demands for some practical application of his knowledge has often prevented the engineer from carrying his studies to their logical conclusions and enriching the world with the fruits of his investigations.

The California Blue Sky Law

Irrespective of individual opinion as to the merits and demerits of the laws which have been enacted by the California legislature during the session just closed, no one will controvert the statement that as a whole they are the most radical ever passed by any state legislature. Through the strange irony of fate many of them are likely to be repealed by the people through the medium of the initiative which was established in this state by the political party which apparently recks so little of the wrecks it may cause in statesmanship or finance. One law, however, is likely to stand as a monumental light house to safeguard the interests of the investor. Following the lead of other progressive states, an adequate "blue sky law" now is ready for enforcement.

By a "blue sky law" no reference is intended to the campaign for industrial smoke prevention concerning which this term is frequently employed. Blue sky is a figurative expression for publicity, freedom from haziness, and refers to those financial transactions which might be characterized as shady.

The provisions of the bill are directed primarily against the unscrupulous get-rich-quick promoters of mining and oil stocks, a nefarious class which heretofore could be reached only indirectly through federal means. It is in no way concerned with the public service corporations, which are already under the control of other adequate commissions, state or federal. Its control over all other investment companies is most drastic, the intention being to eliminate all forms of wild-cat speculators in the state.

No securities can be issued by any corporation coming under the provisions of this act until a permissive certificate shall have been granted by the "commisioner of corporations" after he has made due examination as to the financial condition and purposes of the company. Semi-annual reports must be filed, subject to public inspection, though the commissioner is given discretion to withhold any information if he deems it to the best interest of the public or the corporation. Deceptive statements in advertisements or elsewhere are made unlawful and subject to severe penalties, as are all other violations of the act. The certificate is revocable should the commission find at any time that the "proposed plan of business is unfair, unjust or inequitable."

Great power is thus seen to reside in the discretion of the commissioner and the effectiveness of the law is in a large measure dependent upon his integrity.

PERSONALS

ITEMS FOR THIS DEPARTMENT ARE SOLICITED FROM ALL READERS

Paul Shoup, president of the Pacific Electric Railway Company, is at San Francisco from Los Angeles.

Elmer Dover, head of the Western States Gas & Electric Company at Tacoma, Wash., is at San Francisco.

S. J. Keese, manager of the Westinghouse Company, Los Angeles, has been spending a few days in San Francisco.

A. G. Wishon, general manager of the San Joaquin Light and Power Company, was at San Francisco during the past week.

S. B. Gregory, Pacific Coast manager for the Arrow Electric Company, has returned to his San Francisco offices from Los Angeles.

H. E. Grant, sales engineer with the Holophane Works of the General Electric Company, has returned to San Francisco from Vancouver, B. C.

J. O. Presbrey, general representative of the Holophane Works, and **H. N. Lauritzen**, Pacific Coast manager for the company, are at Los Angeles.

Carl Heise, manager of Westinghouse Electric & Manufacturing Company, San Francisco, is on the road to recovery from a very painful accident.

W. H. Banes, formerly with J. C. English & Company of Portland, is now superintendent for Cope & Sons, electrical manufacturers at Vancouver, B. C.

J. G. Behneman, dealer in electrical supplies, Seattle, has added **W. H. Morrow**, formerly with the Pacific Telephone & Telegraph Company to his sales force.

F. W. Wilson, formerly associated with the Asbestos Manufacturing and Supply Company, has become identified with the Standard Underground Cable Company at their San Francisco office.

George Locke, formerly with the Denver Gas & Electric Company, has been made commercial manager of the Honolulu Gas & Electric Company at Honolulu, Hawaii.

Fred Skeel, Western manager of Crouse-Hinds Company, Syracuse, is in California, and is due to arrive in San Francisco from the southern part of the State the first part of the week.

Geo. Boring, sales manager at Portland, **F. J. Airey** of Los Angeles, and **E. A. Norton**, Seattle, are attending a sales managers' meeting of the Pacific States Electric Company in San Francisco.

O. H. Ensign, chief electrical engineer, United States Reclamation Service, Los Angeles, Cal., has been transferred to the grade of Fellow of the American Institute of Electrical Engineers.

J. G. Deremer, chief engineer with the United Light & Power Company, has just returned to San Francisco from a few weeks' stay in Southern California, during which time he visited the aqueduct project.

Jesse S. Jones of Tacoma, member of the Washington public service commission for the past six years, has severed his connection with that department and has been succeeded by **Arthur A. Lewis** of Spokane.

O. W. Petersen has been appointed assistant superintendent at the Lake Spaulding development of the Pacific Gas & Electric Company, and **M. H. Richards**, assistant superintendent of developments Nos. 4 and 5.

W. B. Mel, formerly superintendent of light and power at the plant of the University of California, has joined the electrical engineering staff of the Pacific Gas & Electric Company, under the direction of Frank Varney.

R. F. Behan, assistant to manager of Westinghouse Electric & Manufacturing Company, and **R. A. Balzari** were lecturers before the the Pacific Gas and Electric Company recently, the subject of the talk being on "Small Motor Applications."

E. B. Bumstead, vice-president of the Oro Electric Corporation, left San Francisco for the East this week. All new construction has been discontinued by the company and 600 or more employees have been let out. Lack of funds is stated to be the cause.

A. L. Humphreys of Pittsburgh, Pa., vice-president and general manager, and **C. J. Olmstead** of Chicago, general Western manager of the Westinghouse Electric and Manufacturing Company, are at San Francisco on an inspection tour of the company's business on the Pacific Coast. They will spend several days here going over the affairs of the branch plant established at Emeryville a year ago.

W. J. Grambs, superintendent of light and power and **G. E. Quinan**, operating superintendent of the Puget Sound Traction, Light & Power Company, Seattle, left May 17th to attend the National District Heat Association, to be held at Indianapolis, May 27th to 29th, and the 36th annual convention of the National Electric Light Association to be held in Chicago June 2d to 6th. After the latter convention Mr. Quinan will return to Seattle while Mr. Grambs will visit cities on the Atlantic Coast.

James E. Barker, engineer on the Board of Public Utilities, Los Angeles, **V. Y. Davoud**, electrical and mechanical engineer with the Utah Power & Light Company at Salt Lake City, **Thomas Foulkes**, Commissioner on the Board of Public Utilities, Los Angeles, **S. R. Inch**, general superintendent Utah Power & Light Company, Salt Lake City, **A. S. Kalenborn**, engineer of distribution for the Oro Electric Corporation, San Francisco, **E. R. Northmore**, superintendent of electrical distribution for Los Angeles Gas & Electric Corporation, Los Angeles, and **E. Woodbury**, engineer of electrical construction with the Pacific Light & Power Corporation, Los Angeles, have been transferred to the grade of Member of the American Institute of Electrical Engineers.

B. S. Josselyn, president of the Portland Railway, Light & Power Company, was the guest at a banquet tendered to him by the Portland Electric Council of the Royal Arcanum, on May 16. **W. T. Buchanan** acted as toastmaster and the first speaker was **Franklin T. Griffith**, who on July 1, will succeed Mr. Josselyn as president of the Portland Railway, Light & Power Company. He was followed by **George W. Hazen**, past regent of Multnomah Council; **C. J. Franklin**, past regent of Portland Electric Council; **H. C. Webber**, past regent of Multnomah; **J. F. McKinney** of Portland Electric Council; **J. E. Wellein**, deputy representative of the grand lodge of the Royal Arcanum.

NEWS OF GOLDEN POPPY SPECIAL NO. 2.

The energetic work of the past few weeks has materialized in a large list of reservations for the Golden Poppy Special No. 2, which will leave San Francisco on May 29th for the Chicago convention of the National Electric Light Association. The local entertainment committee has prepared a most attractive program enroute.

Mr. E. B. Strong, chairman of the Western Transportation Committee announces that on and after Monday, May 26th, headquarters will be established in the Southern Pacific ticket offices in the Palace Hotel at New Montgomery and Market streets.

The following cordial invitation has been received from the Utah Electric Club:

The Utah Electric Club and local members of the N. E. L. A. take this opportunity to invite the delegates enroute to the N. E. L. A. Convention at Chicago, to stop off at Salt Lake City for the few hours you may be in our city.

A committee has been appointed to take charge of this

entertainment, and we shall expect you to arrive in Salt Lake City on May 30th, at 10:30 a. m., and will provide entertainment until 3:00 p. m. A part of this committee will meet you in Ogden and hand you at this point a program explaining the entertainment for the day.

Hoping to have the pleasure of receiving a favorable reply to this invitation, we wish to remain.

Very truly yours,

THE UTAH ELECTRIC CLUB,

(Signed) C. B. Hawley, President.

MEETING NOTICES.

Electrical League of Southern California.

Tuesday, May 13th, was Ladies' Day with the Electrical League of Southern California, nearly ninety members and fair guests being present. An excellent address was given on the public school system. On April 20th T. P. Lukens, ex-forest supervisor, spoke on the Forest Service.

Oregon Technical Club.

Dr. Calvin G. White, president of the State Board o. Health, addressed the members of the Oregon Technical Club at their regular luncheon at the Commercial Club on Monday May 12th. Dr. White spoke on "Water Supply for Cities and Towns of Oregon." Mr. R. G. Dieck, consulting civil engineer, was chairman of the day.

Electrical Development and Jovian League.

Last Tuesday was Jovian Day with the League, the Jovians under the direction of Statesman Halloran having charge of the meeting. Practical demonstration of the pulmoter was the feature of the meeting and proved to be a subject of utmost interest. The jobbers are to take charge of next week's meeting.

Pacific Claim Agents' Association.

The Pacific Claim Agents' Association will hold its fifth annual convention at Vancouver, B. C., July 10, 11, 12. George Carson, claim agent of the Puget Sound Traction, Light & Power Company, Seattle, is president of the association and Ida P. Newel of the Portland Railway, Light & Power Company, is secretary-treasurer.

Seattle Section, A. I. E. E.

The May meeting of the Seattle Section of the American Institute of Electrical Engineers was held Tuesday evening, May 20th, in the assembly hall of the Chamber of Commerce, under the auspices of the Committee on Transmission, Substations and Distribution. Four ten-minute papers were presented as follows: "High Tension Transmission," by M. T. Crawford; "Substation Construction," by C. F. Terrell; "Alternating Current Distribution Systems," by N. C. Nelson; "Direct Current Distribution Systems," by C. R. Collins. Prepared discussion was also contributed by several other local engineers engaged in work along these lines.

Puget Sound Traction, Light & Power Company.

A meeting of the Central and Division Safety Committees of the Puget Sound Traction, Light & Power Company was held in the assembly room of the company's building on May 8th at which 65 members were in attendance. George Carson, claim agent of the company and chairman of the Central Safety Company, presided. The meeting had for its object a discussion of the accident situation. The chairman called attention to the fact that the organization of the safety committees had proved more successful by far than had been anticipated; that general operation had much improved and gave every promise of continuing to improve. The relations between the officials of the company and the men in the ranks had become closer and more satisfactory since the organization. Much statistical information was submitted by the chair together with pertinent comment and suggestions in relation to the various classes of accidents. He also reviewed the reports made by the various members of the Division Safety Committees as well as the action taken on same.

A. L. Kempster, general superintendent of the company; D. W. Henderson, superintendent of transportation; G. P. James, chief engineer; C. B. Harrington, assistant general superintendent; J. D. Nice and W. A. Burrell, division superintendents, took part in the discussion, after which the meeting was thrown open to all members desiring to speak on matters of interest to operation, resulting in many valuable suggestions being offered.

The chairman closed the meeting by making a plea for the new men entering the service, urging that they be assisted as much as possible with their work by the various members of the committees. He also urged that members continue to send in reports even though their terms of appointment on the safety committees might have expired. The session, lasting two hours, proved very interesting.

SOCIETY FOF ELECTRICAL DEVELOPMENT.

The annual meeting of the Society for Electrical Development was called in accordance with the by-laws at 11:30 a. m., May 13th, and adjourned to convene in Chicago, June 2d, at the Hotel Sherman at 11 a. m., for the greater convenience of the members of the Society who would attend the annual convention of the National Electric Light Association and for the convenience of those members of the National Electric Light Association from the West who would have found it difficult otherwise to come east on two different occasions.

The regular annual meeting of the Board of Directors was held and an enormous amount of preparatory work done to put everything in readiness for the meeting of the 31st.

The financial statement of the Society showed an amount considerably in excess of $100,000 has already been pledged to assist in carrying out the work of the society when the active work will be started, which will be when minimum subscriptions have been made to the amount of $200,000. Also the financial statement showed that there was still on hand in cash from the advance subscriptions made by the board of directors of the society, a sufficient amount to carry out the further necessary organization work, and obtaining of members up to the desired amount, and the committee approved of an additional expenditure to publish a booklet covering the history of the society, together with the complete plans of the contemplated work, by-laws, etc.

Also the committee approved the engaging of an editorial or publicity man who could begin a certain amount of collection of material, and in the meantime be of assistance to the present staff of the society in developing the membership and other work. Mr. Stephen L. Coles well known throughout the electrical industry as a former managing editor of the Electrical Review, will be affiliated with the society in this position.

Appointment was made of a nominating committee who will make their report for nomination for officers and directors before the full membership at the annual meeting in Chicago.

Further the committee approved the report of the committee on plans, which committee met May 6th and laid out from the great mass of ideas and suggestions made a definite concrete plan for the active work of the society. The general aims of the society already have the approval of the public policy committee and executive committee of the National Electric Light Association, and also the approval of the National Electrical Supply Jobbers' Association, the National Electrical Contractors' Association and a number of the representative electrical manufacturers and the detail plans as approved by the plans committee and board of directors are as follows:

Advertising.

A national advertising campaign in general magazines, trade and class papers, etc., this campaign to be of a broad

educational nature designed to educate the consuming and non-consuming public to the many advantages of electricity for light, heat, power and other useful purposes, including special arguments for adequate wiring circuits, outlets, etc.

A comprehensive follow-up system in connection with the above, so that each individual member will receive a copy or notification of every inquiry coming from his locality, and the manufacturing members will receive direct copy or notification of every inquiry made relating to the apparatus which they manufacture.

Stimulating and assisting in the publication of educational literature of various kinds to architects, builders, other trades and the public, including publications of a similar character to those now being issued by the commercial section of the National Electric Light Association, Illuminating Engineering Society and by other outside agencies, and where it is not possible to stimulate the publication of booklets of this character, organization of this department to prepare those which seem necessary or advisable.

Booklets of an educational nature to be used as far as possible in answering direct inquiries coming from national advertising and other sources and also to be supplied in quantities at a minimum cost to members of local distribution through co-operation with above agencies.

Collecting of material from central stations, manufacturers, advertising agencies, etc., and preparation of additional material if advisable, so that specific information can be furnished relative to advertising copy and cuts for newspaper advertising, booklets, folders, envelope stuffers, circular letters, etc., to assist members in planning and carrying out advertising campaigns. This can be accomplished at low cost by close co-oporation with members, advertising agencies, etc.

Advising and arranging for and furnishing material for national publicity and advertising weeks (or months) on certain phases of electricity.

Accumulating and furnishing to members data regarding development and sales campaigns to increase the use of electric signs, improve and develop street lighting, power, heating, etc.

Maintaining of information bureau for statistics and data of various kinds relating to commercial subjects—merchandising, selling campaigns, advertising, etc.

Publicity.

The accumulating and disseminating of data, photographs, etc., for use in newspapers, general magazines, trade and class papers, as well as to free lance writers, furnishing data, articles and stories of all character to all class of publications, including architectural, building, farm publications, women's magazines, etc., etc.

Furnishing articles and information to the trade press as well as the bulletins of the National Electric Light Association, the Jovian Order, National Electrical Contractor, Illuminating Engineering Society, Efficiency Society, etc., etc.

Furnishing of news material to co-operative newspaper pages where requested.

Furnishing of a news service to members to be used locally in newspapers.

Arranging with newspapers through the country and with magazines, newspaper syndicates, trade press, special writers, etc., for stories, articles and information.

Preparing and disseminating of articles and information which will assist in the unification of water power laws, electrical ordinances, sign and wiring regulations and the like.

Preventing as far as possible the publication of untrue articles or stories tending to injure the business or mislead the public and to correct any misinformation published.

Field and General Effort.

Co-operation with Jovians and other electrical societies and organizations as a national proposition and locally among the various branches and local leagues to obtain co-operation in the industry and in the carrying out of the society's work.

Suggesting various ways and means for co-operation among the different electrical interests in the electrical and allied industries and stimulating as far as possible more harmonious relations and wider co-operation among the various interests engaged and either by stimulating local endeavor or by carrying out work direct, assist in various lines of local development, etc., etc.

Suggesting ways and means of co-operation locally in the various cities with the chambers of commerce, boards of trade, etc., for the development of the electrical business and the development of cities.

Addresses by trained men before various electrical societies and before architectural, building trades and various other industries to increase co-operation and acquaint them with the greater value of electricity for light, heat, power and all other useful purposes.

Working nationally and locally for better co-operation with underwriters' laboratories throughout the electrical business, to improve conditions generally, a special committee to be appointed for this purpose.

Stimulating and assisting in organization of co-operative community advertising.

Arranging locally for equipping of various industrial plants for electricity to the fullest point of saturation.

Exchanging information regarding plants so equipped and arranging for publicity throughout the industry and to the public regarding such plants.

Assisting in plans for bureau for lectures and demonstrations in various cities.

Assisting general co-operative plans for moving picture exhibitions, exchanging of films, etc., perhaps in connection with traveling electrical show.

Assisting by suggestion in ways and means for developing day load, electricity on the farm, household appliances, power, etc.

The committee reported that after due consideration of such advertising agencies who had communicated with the society relative to handling of the society's account and of such other agencies as the committee has knowledge of, that Frank Presbrey Company of New York be engaged.

The committee further recommended that Mr. C. W. Lee and Mr. Frank B. Rae Jr. be engaged on some basis to assist in carrying out special advertising plans of the society.

Also the board of directors approved the awards as given in the report of the committee on design and slogan contest, which report follows:

"Meeting held May 5, 1913, in the offices of the society.

"The committee reports after careful consideration of the 2675 designs and slogans submitted by the various contestants, that the prize of $100 for the most suitable design was awarded to the design submitted by Philip S. Dodd.

"The prize for the slogan was awarded to five contestants who have submitted the same slogan. The five contestants being:

"J. A. Burk, United Electric Light & Power Company.

"E. B. Featherstone, Pacific Gas & Electric Company, San Jose, Cal.

"Max Loewenthal, New York.

"C. B. Briggers, League of Jovian Interests, St. Louis, Mo.

"K. Tornberg, 91 Hanover street, Lynn, Mass.

"Mr. Dodd being an officer of the society, has added the amount of the design prize, viz: $100, to the $100 offered for the most suitable slogan and the total, viz. $200, will be divided among the five contestants who have submitted the winning slogan."

It was decided that the great mass of material correlated in the various papers and discussions at the conference held March 4th and 5th would be bound together in an inexpensive volume and distributed on request.

A special committee was appointed to prepare sugges-

tions for an amendment to the constitution covering the classification of members. It appears that there has been some objection on the part of some of the electrical interests to subscribing on the basis of their gross annual sales through the belief that it would be necessary to divulge what their annual sales would be and for this reason while the suggestion was that the proportions would remain the same, that some method be worked out whereby it would not be necessary to state so absolutely just what the volume was in each case.

"DO IT ELECTRICALLY."

Mr. Charles E. Brown of the Central Electrical Company, Chicago, was elected as a director of the society to take the place of R. V. Scudder, deceased, and Mr. John R. Galloway of Washington, D. C., was elected as a director to take the place of P. N. Thorpe, resigned.

The board of directors of the society recommend strongly to the members of the society that the design and slogan selected for the society be used on the stationery and in all trade paper, magazine and newspaper advertising, also on all house organs issued by the members and in every other way possible.

PICNIC OF GENERAL ELECTRIC AND PACIFIC STATES ELECTRIC COMPANIES.

On May 17th the General Electric Company and the Pacific States Electric Company held a council and resolved "when business interferes with pleasure, give up business"; they put the resolution into execution, screwed down the business lid tighter than a sheriff attachment, and office boys and bosses, sweethearts, wives and babies betook themselves to Idylwood Park, a beautiful spot in Niles Canyon on the Western Pacific road.

Arriving at the grounds, the first serious business was the baseball game between the Pacific States and the General Electric, the former being given the decision.

The gate prize was then decided in a way to make all hopeful and nervous for a while. The numbers of all the railroad tickets were put in ten hats. Two numbers were then drawn from each hat by dainty little Miss Stotler. Then these twenty numbers were drawn from another hat, the last two being the winners. Miss Olga Zachau won the prize and took the grip. But she will not call in a doctor.

The tug of war was won by the Pacific States team that averaged 198 to the man as against 210 for the G. E. team.

The racing was relayed off to a crowd of interested rooters. C. H. Tallant of the G. E. won the Paul Carroll hat for the 100 yard, but had to clean out twenty others by the elimination process to get it.

The ladies' 50 yard dash was won by Miss Marion Ross in dashing style.

The pie eating contest was a scream for everybody but the eaters, they were too busy. Their hands are tied and the only tools allowed in the game are the respective faces. They gouge, they bite, they scoop, they lick, they burrow from throat to forehead, from ear to ear, from Siskiyou to San Diego is huckleberry. Moseley inflicted the most punishment to the pies. Fagan succeeded in assimilating the most on the outside of his face but Pacific States Marra got the most inside of his and won the prize.

The other prizes awarded were: Bean bag throwing, under seven years, Ellen Bwelly won a game; under twelve, roller skates, won by George Curtis, sack race, scarf pin, won by Ray Kahn; hop, skip and jump, an umbrella, won by Mr. Coombs; baseball throwing for ladies, a cut glass fruit bowl, won by Miss Pierce.

Rain began to fall about four o'clock after the games were well over, which drove the crowd to cover in the dance pavilion. Dancing was continued until six o'clock, the time set for leaving. The day, while overcast, was propitious for the scheduled sport and the rain was merely an incident that detracted from no one's pleasure.

NEWS OF ELECTRICAL CONTRACTORS.

The Electrical Engineering Company, 112 Marion street, Seattle, will soon start on the job of wiring the new Sun building now under construction on Fifth avenue, between Pike and Union streets.

Davis & Hall, electrical contractors and engineers, Tacoma, have practically finished the electrical work on the lift bridge across the Puyallup River in the tide flat section. The equipment is similar to that used in the Eleventh street bridge, installed by this firm some time ago.

Wm. A. Mullins Electric Company, Tacoma, has the contract for wiring the new hollow tile residence of John Chalmers. There will be about 40 outlets, together with switches, underground service and conduit. The company has just completed wiring the residence of J. R. Thompson at Lake Steilacoom.

The contract for equipping the new Central school at Tacoma with electrical elevators was let to the Washington Machinery & Elevator Company, a local concern, at $2800.

The A. G. Electrical & Manufacturing Company, Seattle, recently furnished for the new Empress theater at Portland a special type of rotary alphabetical announcing board. A telegraphic order has also been received for a complete equipment of this kind for Pantages theater at Edmonton, Alberta.

NEWS OF CALIFORNIA RAILROAD COMMISSION.

The railroad commission rendered a decision granting a certificate of public convenience and necessity to the Los Angeles Gas & Electric Corporation to exercise rights and privileges granted by the city of Eagle Rock and by the city of Watts.

A decision was rendered granting the application of Southern Sierras Power Company for a certificate of public convenience and necessity to operate under franchise in Kern county.

A decision was rendered fixing the gas rate for the Southern Counties Gas Company, in the city of Orange, at $1.22 per thousand cubic feet. The former rate of $1.15 was found to be unreasonably low, in view of the circumstances involved.

The Southern California Edison Company has applied for a certificate of public convenience and necessity for the construction of an electric distribution system in Beaumont.

A supplemental decision was rendered providing that the Northern California Power Company should make returns to its patrons of all moneys previously collected in excess of the established rates.

The Great Western Power Company has applied for an order preliminary to the issuance of a certificate of public convenience and necessity to exercise franchise rights in Contra Costa county.

NEWS NOTES

INCORPORATIONS.

SALEM, ORE.—The Santiam Water Company has been organized with a capital stock of $300,000 to supply Salem and neighboring towns with water from the north fork of the Santiam River. The incorporators are W. E. Pierce of Boise. Chas. Theis of Spokane, John D. Turner of Salem. The offices will be at Salem. The company will lay a line from the Little North Fork to Salem and the state institutions.

ILLUMINATION.

FLAGSTAFF, ARIZ.—A franchise has been granted to the Flagstaff Electric Light Company, for electric light plant, upon which work will begin at once.

UNION, ORE.—The council has rejected the bid of Green Bros, of Spokane for the installation of a municipal electric lighting plant.

OLYMPIA, WASH.—The city of Olympia has granted an electric power franchise and a steam heating franchise to the Lemon-Foshay syndicate of that city.

BAKER, ORE.—The council has authorized the mayor to employ the services of a competent engineer to estimate the cost of construction of a lighting system.

GREAT FALLS, MONT.—The Libby Water, Electric Light & Power Company, owning the Libby water and light systems, will expend about $7000 during the summer on improvements.

OAKLAND, CAL.—An ordinance was passed by the council granting to the Great Western Power Company, permission to erect, construct and maintain poles, towers and piers for transmitting electricity in the county of Alameda for a period of 35 years.

EDMONTON, ALTA.—Rate payers will be asked to decide at a special election the question of the city supplying natural gas from municipal well or buying gas at the city limits and selling from the municipal distributing plant. Estimated cost of distributing plant, $2,500,000.

NEZ PERCE, IDAHO.—The Lewis Electric Company, with all its light and water plants in Lewis and Clearwater counties, becomes the property of and part of the Grangeville Electric Light & Power Company. E. T. Scholer of Lind will superintend the operations of the newly acquired property.

TRANSMISSION.

ASTORIA, ORE.—Wm. H. Galvani, engineer in charge, has been here perfecting plans for the extension of the power and light lines of the Pacific Power & Light Company to Warrenton, Hammond, Fort Stevens and Clatsop Plains to Gearhart Park.

CULBERTSON, MONT.—The Montana Power Company has come into possession of the entire capital stock of the Thompson Falls Power Company, the Great Falls Water Power & Townsite Company and all rights, title and interest in the Missoula River Power Company sites.

FRESNO, CAL.—The San Joaquin Light & Power Company is getting ready to install a 10,000 volt distributing line to supply the Barstow Colony with electric power for pumping and domestic purposes. The line will be about 10 miles long and will be built from a point near Rolinda to the San Joaquin River. Laterals will be built to the individual consumers along the line.

FRESNO, CAL.—The survey for the transmission line of the San Joaquin Light & Power Company between Porterville and Formosa has been completed and the company will start work on the line immediately. This 60,000-volt transmission line, when completed, will form a complete circuit of high power lines about Fresno connecting Merced, Coalinga Taft, Bakersfield and Porterville with the power plant in Crane Valley. The new substation at Formosa has just been completed. This station will supply the McFarland and Wasco territories.

SAN FRANCISCO, CAL.—F. G. Baum, chief engineer of the hydroelectric department of the Pacific Gas & Electric Company, has returned from a tour of inspection of the new construction under way in the vicinity of Lake Spaulding. He reports that the big dam is now 43 ft. above the river bottom, and that all that remains to be done on the mile-long tunnel is a little trimming. The canal from Bear Valley is more than half completed. At Christian Valley and Auburn two dams are completed, and two more are being begun. The canal between Clipper Gap and Auburn should be finished by August 1. The Christian Valley dams will furnish 10,000 h.p. of electric energy, and the works at Auburn 17,000 h.p. Indications point to the completion of the Lake Spaulding dam this year. Its total height will be 305 ft. and the work is progressing at the rate of 1000 cu. yds. of concrete a day.

LOYALTON, CAL.—The Mountain Development Company will begin construction by June 15th of its reservoir and power plant near Sattley. The plans for the project, which will cost $180,000, call for the diversion of Berry Creek and a main reservoir in Wild Bill Canyon. The principal dam will be 50 ft. high, 230 ft. long at the top and 60 ft. long at the bottom. It will be 35 ft. thick at the bottom and 7 ft. at the top. The reservoir capacity will be 150 acre feet. The company plans an additional small dam across a slight depression at one side of the valley sufficiently to restrain an additional 35 acre feet, making the total capacity of the reservoir 185 acre feet. Two smaller auxiliary reservoirs will be built farther up the same canyon. There is a fall of 1385 ft. from the reservoir to the site of the power plant in the valley below, and approximately 3500 h.p. will be developed.

SEATTLE, WASH.—City Engineer A. H. Dimock of Seattle has recommended that the city acquire the Lake Cushman power project which has been offered at $640,000. The cost of developing the project is estimated at $5,063,000. The purchase of the property was authorized by the voters in March, 1911. This vote was held to be advisory and not mandatory. The report of the city engineer outlines the plan of development to be the construction of a dam three miles below Lake Cushman across the Skokomish River, 240 ft. high and 300 ft. long. This would form a lake eight miles long, including Lake Cushman, the waters of which would be raised 150 ft., making a water area of 5½ square miles. A power house on Hood canal would form a part of the development. By constructing the dam below Lake Cushman Mr. Dimock estimates that the storage area would be equal to 217,000 acre feet capable of developing for 12 hours a day, 70,000 h.p. The plan outlined anticipates the transmission of current over high tension lines. The report was referred to the city utilities and finance committees.

TRANSPORTATION.

TACOMA, WASH.—Tacoma voters have defeated a proposal to issue bonds for the construction and operation of a municipal street car line connecting the city with the manufacturing district on the tide flats.

VANCOUVER, B. C.—A contract has been let by the British Columbia Electric Railway Company for a $40,000 club house to Geo. Snider & Brethour. The contract for heating has been let to Kydd Bros.; plumbing fixtures to Musgrove & Blake.

GLENDALE, CAL.—Sealed bids will be received up to June 9th for a franchise granting the right to construct and maintain for a peirod of 50 years, single or double track electric railroad upon and along certain public highways in this city.

SANTA BARBARA, CAL.—Sealed bids will be received up to June 12th, for the purchase of a franchise, granting the right to construct and maintain for a period of years ending in 1957, single or double track railway (street) along certain streets in Santa Barbara.

SAN BERNARDINO, CAL.—Work on a new trunk line of the Pacific Electric Company between Upland and San Bernardino will begin at Fontana, just west of Rialto, on June 7th. There is a 22 mile gap to be built, and work will be completed within six months.

KLAMATH FALLS, ORE.—Geo. Clark of this valley has been informed by Chicago capitalists that they will build an electric line from Klamath Falls to Bonanza, thence to Dairy, on condition that the Klamath people furnish the necessary rights of way without cost to the builders. Surveys have been made over the proposed route and a right of way has been secured as far as the Horton ranch.

PORTLAND, ORE.—The Portland Railway, Light & Power Company has begun work on the extension of the Hawthorne avenue car line. One mile of new track will be laid through the South Mount Tabor district. It starts at East Sixtieth and will be laid on East Division to East Sixty-first, then south to Twenty-ninth avenue and then eastward to East Seventy-fourth street.

MEDFORD, ORE.—The interurban franchise originally secured by the Minney Company of Oakland in January transferred to Colonel F. B. Waite of Roseburg, in March transferred by the Medford City Council was for the third time transferred to S. S. Bullis & Sons of New York, who declare they will begin construction of the electric line within ten days.

SAN FRANCISCO, CAL.—The Board of Works has been directed by the supervisors to file plans and estimates of the cost of a system of municipal street railways from the Embarcadero to terminals at the exposition grounds and the Presidio; also from various points on Market street through Stockton street to the same terminals, and from Market street to the Potrero district; on Van Ness avenue and along connecting streets to Church street, and along California street from Thirty-third avenue to First avenue, and over connecting streets to Geary street. The bill, which carried unanimously on final passage, provides also for the purchase of land and equipment and such extensions and additions to the system as may be deemed necessary.

TELEPHONE AND TELEGRAPH.

LEWISTON, IDAHO.—The Lewiston Orchards Rural Telephone Company will construct a line to serve Lewiston Orchards, under the direction of W. H. Bankson, president of the company.

SALEM, ORE.—The railroad commission has granted petitions of the Pacific Telephone & Telegraph Company to discontinue telephone offices in 67 towns. The reasons assigned by the company were that competent agents could not be obtained and receipts were small. All the towns have other telephone service and may be connected with the long-distance lines of the Pacific Telephon & Telegraph Company.

SAN FRANCISCO, CAL.—A more perfect telephone system has never been devised than the one that is to be installed in the Liberal Arts Building of the Panama-Pacific International Exposition. A huge switchboard will be erected in the center of the building by the Pacific Telephone & Telegraph Company and with thirty operators at work, that switchboard will connect with all departments of the exposition all concessions, rendezvous, clubs and exhibit sections and will be in direct line for long distance calls, local and exposition connections. The exposition will be equipped with two thousand telephone stations and innumerable public booths which will be scattered all over the grounds at convenient points for public usage. An interesting feature of the installation will be that the giant switchboard will be enclosed in a tremendous case of glass, surrounded by a brass rail. Visitors to the exposition will be able to watch a call put in to the main station and then see how it is connected with the party called.

WATERWORKS.

VALE, ORE.—The contract for the construction of the diversion dam and canal, Malheur Irrigation Project, has been awarded to Wells Bros., Portland.

COLTON, CAL.—The Empire Water Company has made application for permission to sell $200,000 worth of bonds for a hydroelectric plant in Coyote creek, San Diego county.

SALEM, ORE.—The state desert land board has instructed Engineer O. Laurgaard to start work at once on the Columbia Southern project in Crook county, for which the legislature appropriated $450,000. The name has been changed to Tumalo project.

LAWNDALE, CAL.—The state railroad commission has granted authority to the Lawndale Land & Water Company to purchase the system of the Lawndale Water Company, to issue $75,000 of stock and $25,000 of bonds; and to change from a flat rate basis to a meter basis.

WATTS, CAL.—The proposed bond election to be held in Watts, for voting on the question of issuing bonds in the sum of $85,000 for a municipal water system, and bonds in the sum of $15,000 for fire fighting and electric fire alarm system, will be held on June 17th, instead of June 7th.

RIVERSIDE, CAL.—By a vote of 5 to 1 Riverside voters have decided on municipal ownership of the city's domestic water. The bond issue of $1,160,000 for the purchases of three privately owned systems carried by a vote of 1893 to 418. Important improvements and extensions are planned

SAN JOSE, CAL.—The San Jose Water Company has applied to the commission for authority to issue $100,000 of short-term notes. The company desires to use the money for the following purposes: For the purchase of water rights from the Pacific Gas & Electric Company, $25,000; for payment of outstanding bills, $40,000, and for new construction, $50,000.

LOVELOCK NEV.—Water from the Pitt-Taylor reservoirs has been turned into the Humboldt River for irrigation of Lovelock valley. W. C. Pitt and John Taylor have for years been engaged in constructing the dams and reservoirs to store the waters of the Humboldt range for use during the irrigation season in Lovelock valley. The enterprise involves $400,000 and is the largest private irrigation scheme in the west. It has doubled the producing area of Lovelock valley.

SAN BERNARDINO, CAL.—A deal is pending between the Maclay Rancho Water Company and the Consolidated Securities Company of Los Angeles, under which the latter company is to take over all properties of the former company including lands, electric and water systems, water rights, and telephone system. If the deal is closed, it is likely that the new owners will put the local water plant in shape or either sell its water rights to the city of San Bernardino.

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